SECTION 5.0

Electric Transmission

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5.1 Introduction

Section 5 discusses the transmission interconnection between the San Francisco Electric Reliability Project (SFERP) and the existing electrical grid, and the anticipated impacts that operation of the facility will have on the flow of electrical power in the San Francisco region of California. To better understand the impacts of the proposed SFERP on transmission and power flows, the discussions in this section will focus on those areas that allow a critical review of the electrical transmission and interconnection. More specifically, this analysis will contain discussions of:

- The proposed electrical interconnection between SFERP and the electrical grid
- The proposed electrical transmission line alignment
- The impacts of the electrical interconnection on the existing transmission grid
- Potential nuisances (electrical, magnetic, audible noise, and corona effects)
- Safety of the interconnection
- Description of applicable laws, ordinances, regulations, and standards (LORS)

The proposed SFERP site is located in an industrial area of the City of San Francisco, California in San Francisco County. This location was selected, in part, for its proximity to the Pacific Gas and Electric Company (PG&E) Potrero Switching Substation. Figure 5-1 (all figures are located at the end of this section) shows the location of SFERP in relationship to the Potrero Substation. This location, adjacent to the Potrero substation, will allow for very short interconnecting transmission lines to SFERP.

The SFERP 115-kilovolt (kV) transmission line will be directly connected to PG&E's transmission system through the Potrero Substation. Two points of interconnection to the substation will be constructed by utilizing two existing switchyard bays. These bays are currently occupied by 115-kV lines from the Potrero Power Plant (Potrero PP) unit 3 and units 4, 5, and 6, respectively.

5.2 Transmission Interconnection

SFERP will link to the power grid through the PG&E Potrero Substation by two three-phase aboveground transmission lines. The proposed 115-kV connection will cross over an existing PG&E service road from SFERP to towers located within the Potrero substation, turn north for approximately 140 feet to a turning tower aligned with existing bays for breaker positions 162 and 192. Breaker positions 162 and 192 are currently connected to the Potrero PP. These lines will be re-located to two existing bays north of Humboldt Street with the addition of two new towers, new breakers, and dead-end structures in the substation. From a new turning tower the two lines will connect to the existing substation dead-end structure (see Figure 5-2). The existing turning towers that serve the Potrero PP will be removed.

From the SFERP switchyard to the connection at the Potrero Substation breakers, the total transmission distance is less than 300 feet. Because the SFERP and the breakers Potrero Substation are directly adjacent to each other, and the requirement for high reliability, no other transmission interconnection alternative has been considered.

5.3 SFERP Switchyard

The SFERP switchyard will be composed of five 115-kV, SF_6-insulated, dead tank, high-voltage circuit breakers in a three-phase ring buss configuration. The main conductors of the ring buss and connections to the generator step-up transformers will be uninsulated tubular aluminum buss bars supported on steel structures with porcelain insulators. Each transformer will connect to a separate node of the ring. The two three-phase circuits connecting the SFERP switchyard with the Potrero Substation will also be connected to separate nodes on the ring. Two dead-end structures will be used to transition these circuits from the open buss work to the transmission cables. For operational flexibility and maintenance, three-pole disconnect switches will be located on each side of each breaker and between each transformer and the ring buss.

Appropriate voltage and current sensing instruments will be provided on the ring buss and the connections to the ring buss to provide complete metering and electrical protection. The ring buss will be supported by a comprehensive protective relaying scheme, including over current and differential current relaying, to ensure a fast response to abnormal conditions that will isolate the affected area and permit continued service of the unaffected parts of the buss. The circuit breaker controls and protective relays will be housed in a relay room of the electrical building just north of the switchyard. The switchyard will also be monitored through the plant control system where breaker position and system parameters will be available to the operator in the main control room. The plant control system will also display all alarm conditions associated with the switchyard.

5.4 Interconnection System Impact Study

The City submitted a completed Interconnection Application (IA) to the California Independent System Operator Corporation (CAISO) for the SFERP. The proposed project at that time consisted of four LM6000 units rated at 48.7 megawatts (MW) each and one steam turbine rated at 15 MW. The maximum output of the proposed project would have been 209.8 MW. The on-line date of the proposed project was June 2005. A new IA has been filed to properly represent the plant as proposed in this application. Since the new plant arrangement with three (3) simple cycle LM6000 combustion turbines will have a lower output, the impact to the grid and PG&E local system is expected to be less.

The proposed project will be connected to PG&E's transmission grid via new 115-kV generation tie lines. The System Impact Study (SIS) report presented the results for a plant of four LM6000 units and the one steam unit that would connect directly to PG&E's Potrero 115-kV Substation. A copy of the SIS is presented in Appendix 5A.

This SIS identified:

- Transmission system impacts caused solely by the addition of the plant as described above
- System reinforcements, if any, necessary to mitigate the adverse impact under various system conditions

To determine the system impacts caused by the addition of the SFERP, studies were performed using the following full loop base cases:

- 2005 Summer Peak
- 2005 Fall Peak

The studies performed included:

- Steady State Power Flow
- Dynamic Stability Analysis
- System Protection

PG&E's evaluation was based on the assumption that Mirant Corporation's proposed Potrero Unit 7 project would not be built. This assumption is consistent with the fact that the SFERP is proposed for the same location as proposed for Potrero Unit 7. PG&E's evaluation has concluded that the addition of the SFERP would cause no normal overloads during conditions studied for 2005. The project would exacerbate one transmission facility overload following Category B contingencies in the 2005 Summer Peak Base Case and none in the 2005 Fall Peak. Following Category C contingencies, the project would cause no overloads during the 2005 conditions studied. Mitigation of the pre-project and post-project overload will be accomplished by an existing PG&E capacity project.

The Substation Evaluation identified no overstressed equipment associated with the SFERP.

Dynamic Stability Study results indicated that the transmission system's transient performance, relative to the CAISO grid planning standards, would not be affected by the SFERP following selected disturbances.

Based on the results of the SIS conducted for a significantly larger SFERP, the SFERP will not adversely affect the grid.

5.5 Transmission Line Safety and Nuisance

This section discusses safety and nuisance issues associated with the proposed electrical interconnection of SFERP with the electrical grid. Construction and operation of the proposed overhead transmission lines will be undertaken in a manner to ensure the safety of the public as well as maintenance crews while supplying power with minimal electrical interference.

5.5.1 Electrical Clearances

Typical high-voltage overhead transmission lines are composed of bare conductors connected to supporting structures by means of porcelain, glass, or plastic insulators. The air surrounding the energized conductor acts as the insulating medium. Maintaining sufficient clearances, or air space, around the conductors to protect the public and utility workers is paramount to ensure safe operation of the line. The safety clearance required around the conductors is determined by normal operating voltages, conductor temperatures, short-term abnormal voltages, wind-blown swinging conductors, contamination of the insulators, clearances for workers, and clearances for public safety. Minimum clearances are specified in the National Electric Safety Code (NESC) and California Public Utilities Commission (CPUC) General Order 95 (GO 95). Electric utilities, state regulators, and local ordinances may specify additional (more restrictive) clearances. Typically, clearances are specified for:

- Distance between the energized conductors themselves
- Distance between the energized conductors and the supporting structure
- Distance between the energized conductors and other power or communication wires on the same supporting structure, or between other power or communication wires above or below the conductors
- Distance from the energized conductors to the ground and features such as roadways, railroads, driveways, parking lots, navigable waterways, airports, etc.
- Distance from the energized conductors to buildings and signs
- Distance from the energized conductors to other parallel power lines

The proposed SFERP transmission interconnections will be designed to meet all national, state, and local code clearance requirements. The minimum ground clearance for 115-kV transmission (per GO 95) is 30 feet in this area. Under normal conditions, the line operates well below maximum conductor temperature, and thus, the average clearance is greater than the minimum. Regardless of design height, the magnetic and electric field calculations are based on these minimum conductor clearances for the lowest-level conductor and the design spacing of the higher-level conductors relative to the lower-level conductors. This is expected to be the worst-case scenario with actual design conductor heights exceeding those used for this analysis.

5.5.2 Electrical Effects

The electrical effects of high-voltage transmission lines fall into two broad categories: corona effects and field effects. Corona is the ionization of the air that occurs at the surface of the energized conductor and suspension hardware due to very high electric field strength at the surface of the metal during certain conditions. Corona may result in radio and television reception interference, audible noise, light, and production of ozone. Transmission lines are designed with standard practices and components designed to reduce or eliminate the effects of corona. Field effects are the voltages and currents that may be induced in nearby conducting objects. The transmission line’s 60-hertz (Hz) electric and magnetic fields can cause these effects.

5.5.2.1 Electric and Magnetic Fields

Operating power lines, like the energized components of electrical motors, home wiring, lighting, and all other electrical appliances, produce electric and magnetic fields, commonly referred to as EMF. The EMF produced by the alternating current electrical power system in the United States has a frequency of 60 Hz, meaning that the intensity and orientation of the field changes 60 times per second.

The 60-Hz power line fields are considered to be extremely low frequency. Other common frequencies are AM radio, which operates up to 1,600,000 Hz (1,600 kHz); television, 890,000,000 Hz (890 MHz); cellular telephones, 900,000,000 Hz (900 MHz); microwave ovens, 2,450,000,000 Hz (2.4 GHz); and X-rays, about 1 billion, billion (10^{18}) hertz. Higher frequency fields have shorter wavelengths and greater energy in the field. Microwave wavelengths are a few inches long and have enough energy to cause heating in conducting objects. High frequencies, such as X-rays, have enough energy to cause ionization (breaking of molecular bonds). At the 60-Hz frequency associated with electric power transmission, the electric and magnetic fields have a wavelength of 3,100 miles and have very low energy that does not cause heating or ionization. The 60-Hz fields do not radiate, unlike radio-frequency fields.

Electric fields around transmission lines are produced by electrical charges on the energized conductor. Electric field strength is directly proportional to the line's voltage; that is, increased voltage produces a stronger electric field. The electric field is inversely proportional to the distance from the conductors, so that the electric field strength declines as the distance from the conductor increases. The strength of the electric field is measured in units of kilovolts per meter (kV/m). The electric field around a transmission line remains practically steady and is not affected by the common daily and seasonal fluctuations in usage of electricity by customers.

Magnetic fields around transmission lines are produced by the level of current flow, measured in terms of amperes, through the conductors. The magnetic field strength is directly proportional to the current; that is, increased amperes produce a stronger magnetic field. The magnetic field is inversely proportional to the distance from the conductors and, therefore, the strength of the magnetic field rapidly decreases as distance is increased from the conductor. Thus, like the electric field, the magnetic field strength declines as the distance from the conductor increases. Magnetic fields are expressed in units of milligauss (mG). The amperes and, therefore, the magnetic field around a transmission line fluctuate daily and seasonally as the usage of electricity varies.

Considerable research has been conducted over the last 30 years on the possible biological effects and human health effects from EMF. This research has produced many studies that offer no uniform conclusions about whether or not long-term exposure to EMF is harmful. In the absence of conclusive or evocative evidence, some states, including California, have chosen not to specify maximum acceptable levels of EMF. Instead, these states mandate a program of prudent avoidance whereby EMF exposure to the public would be minimized by encouraging electric utilities to use low-cost techniques to reduce the levels of EMF.

5.5.2.2 Audible Noise

Corona is a function of the voltage of the line, the diameter of the conductor, and the condition of the conductor and suspension hardware. The electric field gradient is the rate at which the electric field changes and is directly related to the line voltage.

The electric field gradient is greatest at the surface of the conductor. Large-diameter conductors have lower electric field gradients at the conductor surface and, hence, lower corona than smaller conductors, everything else being equal. Also, irregularities (such as nicks and scrapes on the conductor surface) or sharp edges on suspension hardware concentrate the electric field at these locations and, thus, increase corona at these spots. Similarly, contamination on the conductor surface, such as dust or insects, can cause irregularities that are a source for corona. Raindrops, snow, fog, and condensation are also sources of irregularities. Corona typically becomes a principal design concern for transmission lines having voltages of 345 kV and above.

5.5.2.3 EMF Assumptions

It is important that any discussion of EMF includes the assumptions used to assess these values and to remember that EMF in the vicinity of the power lines vary with regard to line design, line loading, distance from the line, and other factors. Both the electric field and audible noise depend upon line voltage, which remains nearly constant for a transmission line during normal operation. A worst-case voltage of 121 kV (115 kV + 5 percent) was used in the calculations for the 115-kV lines.

The magnetic field is proportional to line loading (amperes), which varies as power plant generation is changed by the system operators to meet increases or decreases in demand for electrical power. Line loading values assumed for the EMF studies were based on the maximum plant output. The maximum total output of the SFERP plant is assumed to be a net generation of 145 MW. The power will be transmitted away from the power plant in two circuits.

The data and assumptions used for the EMF studies can be noted from the discussions contained in the following paragraphs and the figures included in the following pages.

5.5.2.3.1 EMF Calculations. EMFs were calculated at 3 feet above flat terrain using FIELDS 1.0, a program developed by Southern California Edison. The FIELDS program uses the basic algorithms for the calculation of electric and magnetic fields listed in the Electric Power Research Institute's *Transmission Line Reference Book*, known as the "Red Book" (pages 330-331, 409-410, and 341-342). The electric field calculation assumes earth as a perfect conductor and sums the vector components of the field created by the charge on each conductor. Likewise, the magnetic field calculation performs a vector sum of the contribution to the field from each of the conductor currents. FIELDS calculates both the square root of the sum of the squares of the vertical and horizontal field components and also the maximum phasor component based upon the magnitude of the major semi-axis of the field ellipse. FIELDS calculates the electric fields expressed as kV/m and the magnetic fields expressed in mG. The various inputs for the calculations include voltage, current load (amps), current angle (i.e., phasing), conductor type and spacing, number of subconductors, subconductor bundle symmetry, spatial coordinates of the conductors and shield wire, various labeling parameters, and other specifics. Magnetic field and corona modeling was conducted on the phase conductors in the southern end of the ring buss in the proposed Potrero Substation. The southern end of the buss was chosen since it is the energized portion of the substation closest to 23rd Street. The distance from the buss conductors to the fence along the northern side of 23rd Street is approximately 140 feet. The modeling was conducted with the worst-case condition of the three combustion turbines operating at full load (nominal 48 MW_{net} each) and the ring buss open on the north end forcing all of the current to flow around the south end of the ring buss.

A power flow model was developed based on SFERP's maximum transmission level.

5.5.2.3.2 Results of EMF and Audible Noise Assessment

Electric Field and Audible Noise. Line voltage and arrangement of the phases determine the electric field. The corona produced in the substation results in the creation of audible noise and radio and television interference. Two different conditions were modeled, corona effects produced in both fair weather and rain. The results of the electric field for 115-kV buss are shown in Figure 5-3.

In fair weather, the audible noise will not be observable by a person standing on the street (even if the other plant equipment were silent, which will not be the case when the plant is operating). During rain, the noise level will be higher but will be masked by the sound of the falling rain drops as well as the sound from the other equipment in the plant.

The corona-produced radio interference may affect AM radio reception but not FM reception. During rain, radio interference may produce a slightly noticeable hum on an AM radio positioned next to the fence when it is tuned to a weak or distant station. In the fair weather case, the radio interference from the ring buss will not be noticeable.

The corona-produced television interference may cause a television receiver to have a noise band across the picture when the television is operated next to the fence. Further away, this will not be noticeable. The audible noise produced for the 115-kV buss is shown in Figure 5-4. Radio and television interferences produced by the 115-kV buss are shown in Figures 5-5 and 5-6, respectively.

Magnetic Field. The magnetic fields generated by the conservative assumptions presented above are 4 mG at the fence. This is a level of magnetic fields that is found in many public places and is typically found in most homes, for instance, in the kitchen near operating appliances. At 60 feet from the fence on the south side of 23rd Street (200 feet from the buss conductors), the magnetic field drops to 2 mG, a level that is experienced in many public places. The results of the magnetic field calculations for the 115-kV buss is provided in Figure 5-7 and the resulting magnetic field created by the generator busses is provided in Figure 5-8.

5.5.2.3.3 Transmission Line EMF Reduction. While the State of California does not set a statutory limit for electric and magnetic field levels, the CPUC, which regulates electric transmission lines, mandates EMF reduction as a practicable design criterion for new and upgraded electrical facilities.

In keeping with the goal of EMF reduction, the interconnection of the SFERP will be designed and constructed using the principles commonly followed by electric utilities. Primary techniques for reduction of EMF are:

- Increase the distance between conductors and EMF sensors
- Reduce the spacing between the line conductors
- Minimize the current on the line
- Optimize the configuration of the phases (A, B, C)

Anticipated EMF levels have been calculated for the SFERP interconnection as preliminarily designed. The CEC requires actual measurements of pre-interconnection background EMF for comparison with measurements of post-interconnection EMF levels. If required, the pre- and post-interconnection verification measurements will be made consistent with

Institute of Electrical and Electronics Engineers (IEEE) guidelines and will provide sample readings of EMF. Additional measurements will be made upon request for locations of particular concern.

5.5.2.3.4 Conclusion on EMF and Audible Noise. In conclusion, the public exposure to EMF and audible noise levels are well within accepted levels.

5.5.2.4 Induced Current and Voltages

A conducting object, such as a vehicle or person in an electric field, will have induced voltages and currents. The strength of the induced current will depend upon the electric field strength, the size and shape of the conducting object, and the object-to-ground resistance. Examples of measured induced currents in a 1-kV/m electric field are about 0.016 milliamperes (mA) for a person, about 0.41 mA for a large school buss, and about 0.63 mA for a large trailer truck.

When a conducting object is isolated from the ground and a grounded person touches the object, a perceptible current or shock may occur as the current flows to ground. Shocks are classified as below-perception, above-perception, secondary, and primary. The mean perception level is 1.0 mA for a 180-pound man and 0.7 mA for a 120-pound woman. Secondary shocks cause no direct physiological harm, but may annoy a person and cause involuntary muscle contraction. The lower average secondary-shock level for an average-sized man is about 2 mA.

Primary shocks can be harmful. Their lower level is described as the current at which 99.5 percent of subjects can still voluntarily "let go" of the shocking electrode. For the 180-pound man this is 9 mA; for the 120-pound woman, 6 mA; and for children, 5 mA. The National Electrical Safety Code (NESC) specifies 5 mA as the maximum allowable short-circuit current to ground from vehicles, trucks, and equipment near transmission lines.

The mitigation for hazardous and nuisance shocks is to ensure that metallic objects on or near the right-of-way are grounded and that sufficient clearances are provided at roadways and parking lots to keep electric fields at these locations sufficiently low to prevent vehicle short-circuit currents from exceeding 5 mA.

Magnetic fields can also induce voltages and currents in conducting objects. Typically, this requires a long metallic object, such as a wire fence or aboveground pipeline that is grounded at only one location. A person who closes an electrical loop by grounding the object at a different location will experience a shock similar to that described above for an ungrounded object. Mitigation for this problem is to ensure multiple grounds on fences or pipelines, especially those that are orientated parallel to a transmission line.

The proposed 115-kV transmission interconnections will be constructed in conformance with GO-95 and 8 California Code of Regulations (CCR) 2700 requirements. Therefore, hazardous shocks are unlikely to occur as a result of project construction or operation.

5.5.3 Aviation Safety

Federal Aviation Administration (FAA) Regulations, Part 77 establishes standards for determining obstructions in navigable airspace and sets forth requirements for notification of proposed construction. These regulations require FAA notification for any construction over 200 feet in height above ground level. Notification is also required if the obstruction is less than the above-specified height falls within any restricted airspace in the approach to airports. The closest airport is Oakland International Airport approximately 34,000 feet to the east and therefore further than the 20,000 feet required for notification.

Based on the height of the transmission structures (42 feet maximum) FAA notification is not needed. Furthermore, there are a number of existing transmission lines in proximity that are of comparable or taller height. As a result of their location and height in relation to the above airfield, the structures of the proposed electrical transmission interconnection will pose no deterrent to aviation safety as defined in the FAA regulations.

5.5.4 Fire Hazards

The proposed 115-kV transmission interconnection will be designed, constructed, and maintained in accordance with CPUC General Orders that establish clearances from other natural and constructed structures as well as tree-trimming requirements to mitigate fire hazards. The Applicant will use trained and qualified maintenance personnel to maintain the interconnection corridor and immediate area of the switchyard in accordance with accepted industry practices that will include recognition and abatement of any fire hazards.

5.6 Applicable Laws, Ordinances, Regulations, and Standards

This section provides a list of applicable laws, ordinances, regulations, and standards (LORS) that apply to the proposed transmission line, substations and engineering.

5.6.1 Design and Construction

Table 5-1 lists the applicable LORS for the design and construction of the proposed transmission line and substations.

TABLE 5-1
Design and Construction LORS

LORS	Applicability	AFC Reference
GO-95, CPUC, “Rules for Overhead Electric Line Construction”	CPUC rule covers required clearances, grounding techniques, maintenance, and inspection requirements	Section 5.4
Title 8 CCR, Section 2700 et seq. “High Voltage Electrical Safety Orders”	Establishes essential requirements and minimum standards for installation, operation, and maintenance of electrical installation and equipment to provide practical safety and freedom from danger	Section 5.2
GO-52, CPUC, “Construction and Operation of Power and Communication Lines”	Applies to the design of facilities to provide or mitigate inductive interference	Section 5.4
ANSI/IEEE 693, “IEEE Recommended Practices for Seismic Design of Substations”	Recommends design and construction practices	Section 5.2
IEEE 1119, “IEEE Guide for Fence Safety Clearances in Electric-Supply Stations”	Recommends clearance practices to protect persons outside the facility from electric shock	Section 5.3

TABLE 5-1
Design and Construction LORS

LORS	Applicability	AFC Reference
IEEE 998, “Direct Lightning Stroke Shielding of Substations”	Recommends protections for electrical system from direct lightning strikes	Section 5.3
IEEE 980, “Containment of Oil Spills for Substations”	Recommends preventions for release of fluids into the environment	Section 5.3

5.6.2 Electric and Magnetic Fields

The applicable LORS pertaining to EMF interference are tabulated in Table 5-2.

TABLE 5-2
Electric and Magnetic Field LORS

LORS	Applicability	AFC Reference
Decision 93-11-013, CPUC	CPUC position on EMF reduction	Section 5.5.2
GO-131-D, CPUC, “Rules for Planning and Construction of Electric Generation, Line, and Substation Facilities in California”	CPUC construction application requirements, including requirements related to EMF reduction	Section 5.2
ANSI/IEEE 644-1994, “Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines”	Standard procedure for measuring EMF from an electric line that is in service	Section 5.2

5.6.3 Hazardous Shock

Table 5-3 lists the LORS regarding hazardous shock protection that apply to the project.

TABLE 5-3
Hazardous Shock LORS

LORS	Applicability	AFC Reference
8 CCR 2700 et seq. “High Voltage Electrical Safety Orders”	Establishes essential requirements and minimum standards for installation, operation, and maintenance of electrical equipment to provide practical safety and freedom from danger	Section 5.3
ANSI/IEEE 80, “IEEE Guide for Safety in AC Substation Grounding”	Presents guidelines for assuring safety through proper grounding of AC outdoor substations	Section 5.3
NESC, ANSI C2, Section 9, Article 92, Paragraph E; Article 93, Paragraph C.	Covers grounding methods for electrical supply and communications facilities	Section 5.3

5.6.4 Communications Interference

The applicable LORS pertaining to communication interference are tabulated in Table 5-4.

TABLE 5-4
Communications Interference LORS

LORS	Applicability	AFC Reference
47 CFR 15.25, "Operating Requirements, Incidental Radiation"	Prohibits operations of any device emitting incidental radiation that causes interference to communications; the regulation also requires mitigation for any device that causes interference	Section 5.3
GO-52, CPUC	Covers all aspects of the construction, operation, and maintenance of power and communication lines and specifically applies to the prevention or mitigation of inductive interference	Section 5.3
CEC staff, Radio Interference and Television Interference (RI-TVI) Criteria (Kern River Cogeneration) Project 82-AFC-2, Final Decision, Compliance Plan 13-7	Prescribes the CEC's RI-TVI mitigation requirements, developed and adopted by the CEC in past citing cases	Section 5.3

5.6.5 Aviation Safety

Table 5-5 lists the aviation safety LORS that may apply to the proposed construction and operation of SFERP.

TABLE 5-5
Aviation Safety LORS

LORS	Applicability	AFC Reference
Title 14 CFR, Part 77, "Objects Affecting Navigable Airspace"	Describes the criteria used to determine whether a "Notice of Proposed Construction or Alteration" (NPCA, FAA Form 7460-1) is required for potential obstruction hazards	Section 5.5.3
FAA Advisory Circular No. 70/7460-1G, "Obstruction Marking and Lighting"	Describes the FAA standards for marking and lighting of obstructions as identified by FAA Regulations Part 77	Section 5.3.3
PUC, Sections 21656-21660	Discusses the permit requirements for construction of possible obstructions in the vicinity of aircraft landing areas, in navigable airspace, and near the boundary of airports	Section 5.5.3

5.6.6 Fire Hazards

Table 5-6 tabulates the LORS governing fire hazard protection for SFERP.

TABLE 5-6
Fire Hazard LORS

LORS	Applicability	AFC Reference
14 CCR Sections 1250-1258, “Fire Prevention Standards for Electric Utilities”	Provides specific exemptions from electric pole and tower firebreak and electric conductor clearance standards, and specifies when and where standards apply	Section 5.3.5
ANSI/IEEE 80, “IEEE Guide for Safety in AC Substation Grounding”	Presents guidelines for assuring safety through proper grounding of AC outdoor substations	Section 5.3.5
GO-95, CPUC, “Rules for Overhead Electric Line Construction,” Section 35	CPUC rule covers all aspects of design, construction, operation, and maintenance of electrical transmission line and fire safety (hazards)	Section 5.3.5

5.6.7 Jurisdiction

Table 5-7 identifies national, state, and local agencies with jurisdiction to issue permits or approvals, conduct inspections, and/or enforce the above-referenced LORS. Table 5-7 also identifies the associated responsibilities of these agencies as they relate to the construction and operation of SFERP.

TABLE 5-7
Jurisdiction

Agency or Jurisdiction	Responsibility
CEC	Jurisdiction over new transmission lines associated with thermal power plants that are 50 MW or more (Public Resources Code [PRC] 25500)
CEC	Jurisdiction of lines out of a thermal power plant to the interconnection point to the utility grid (PRC 25107)
CEC	Jurisdiction over modifications of existing facilities that increase peak operating voltage or peak kilowatt capacity 25 percent (PRC 25123)
FAA	Establishes regulations for marking and lighting of obstructions in navigable airspace (AC No. 70/7460-1G)
Local Electrical Inspector	Jurisdiction over safety inspection of electrical installations that connect to the supply of electricity (NFPA 70)
City and County of San Francisco	Establishes and enforces zoning regulations for specific land uses. Issues variances in accordance with zoning ordinances
	Issues and enforces certain ordinances and regulations concerning fire prevention and electrical inspection

LEGEND

- PUMP STATION
- PROCESS WATER SUPPLY
- COLLECTION BOX
- SITE LOCATION
- LAYDOWN CONSTRUCTION AREA
- PG&E POTRERO SUBSTATION

0 1,100 2,200 Feet

N

FIGURE 5-1
LOCATION OF SFERP AND PG&E POTRERO SUBSTATION

SAN FRANCISCO ELECTRIC RELIABILITY PROJECT

CH2MHILL

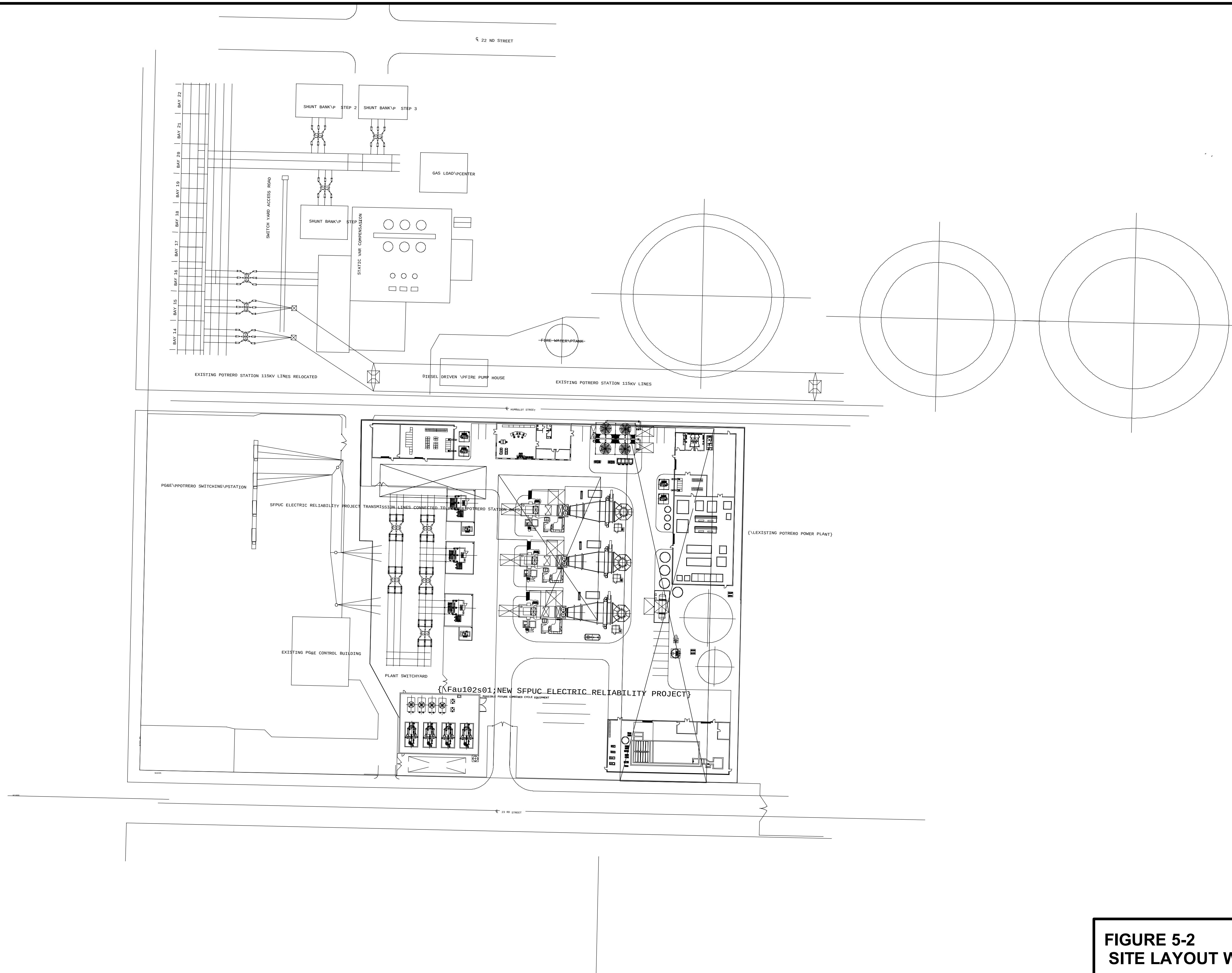

FIGURE 5-2
SITE LAYOUT WITH TRANSMISSION LINES
SAN FRANCISCO ELECTRIC RELIABILITY PROJECT

CH2MHILL

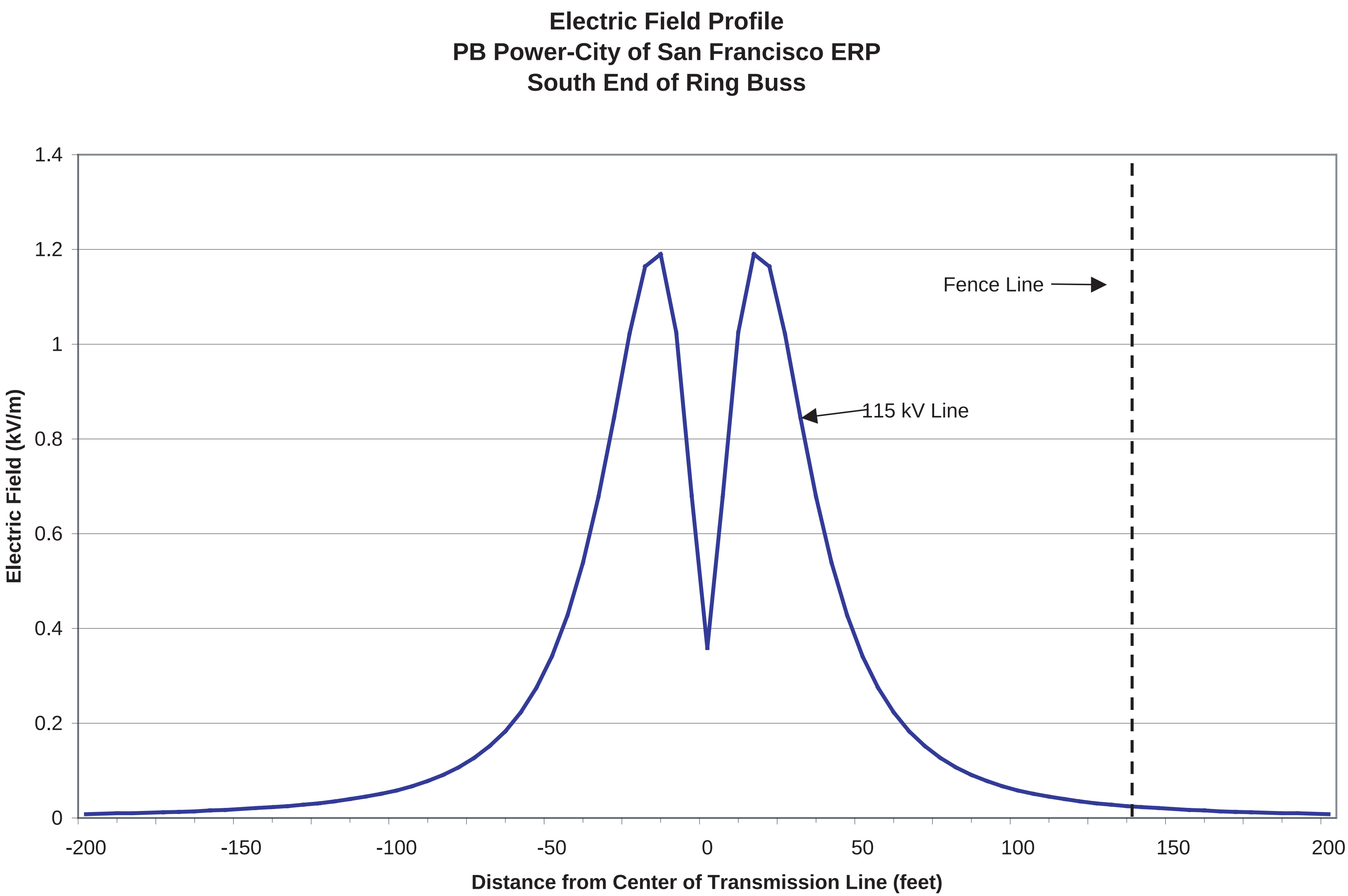

FIGURE 5-3
ELECTRIC FIELD FOR 115kV BUS
SAN FRANCISCO ELECTRIC RELIABILITY PROJECT
CH2MHILL

D012004005RDD_22 (3/8/04)

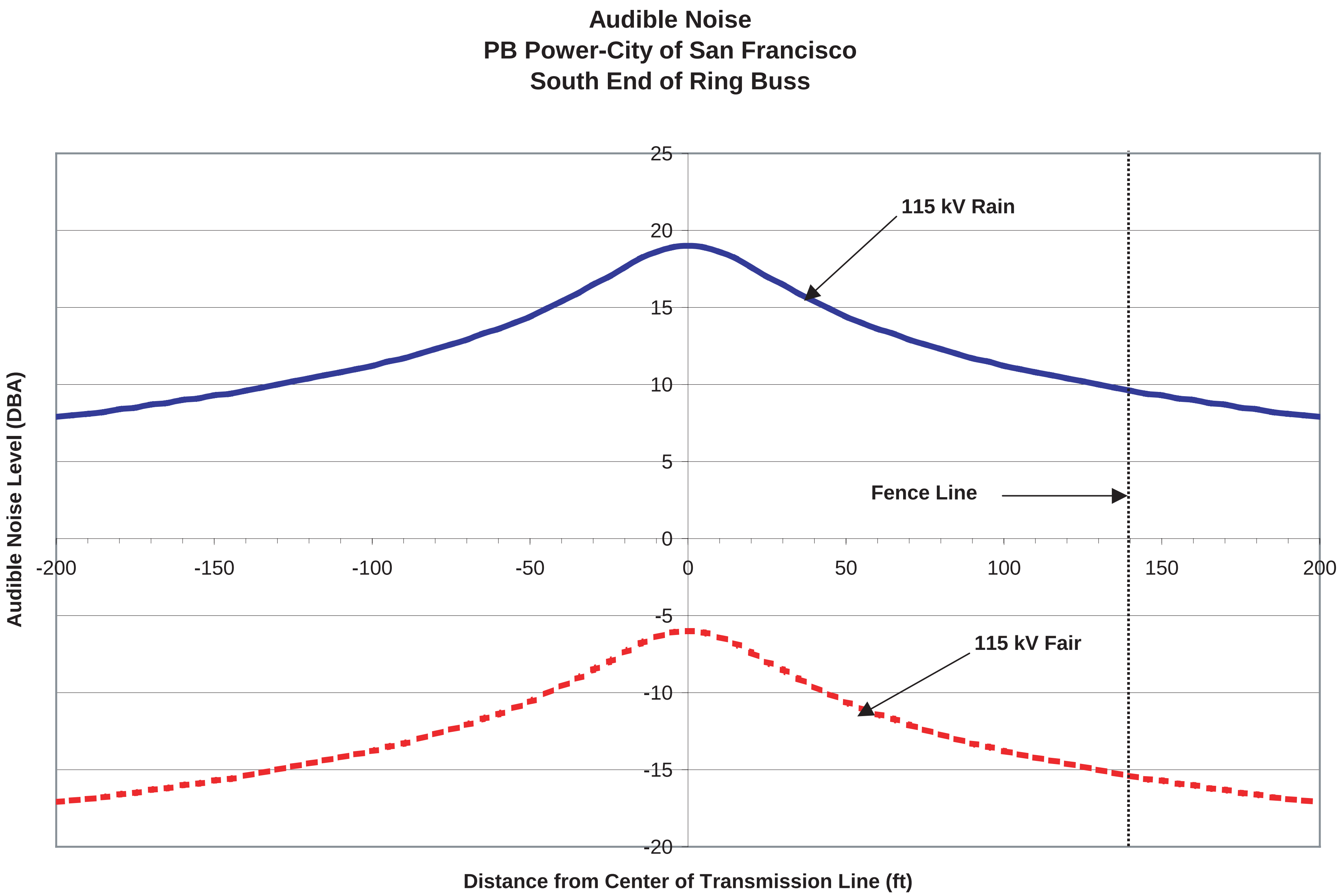

FIGURE 5-4
AUDIBLE NOISE PRODUCED FOR 115kV BUS
SAN FRANCISCO ELECTRIC RELIABILITY PROJECT
CH2MHILL

D012004005RDD_12 (3/8/04)

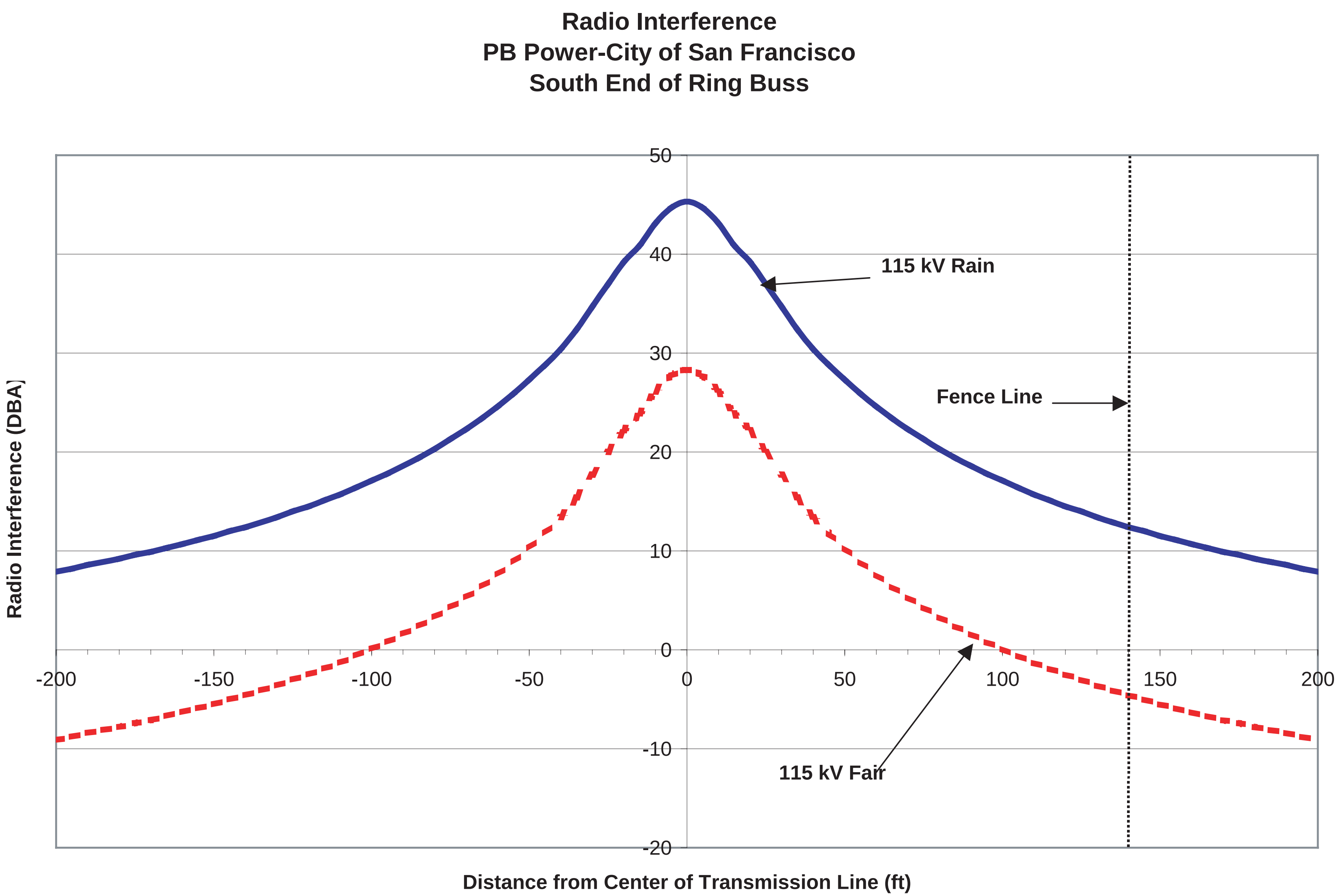

FIGURE 5-5
RADIO INTERFERENCE FOR 115kV BUS
SAN FRANCISCO ELECTRIC RELIABILITY PROJECT

D012004005RDD_13 (3/8/04)

CH2MHILL

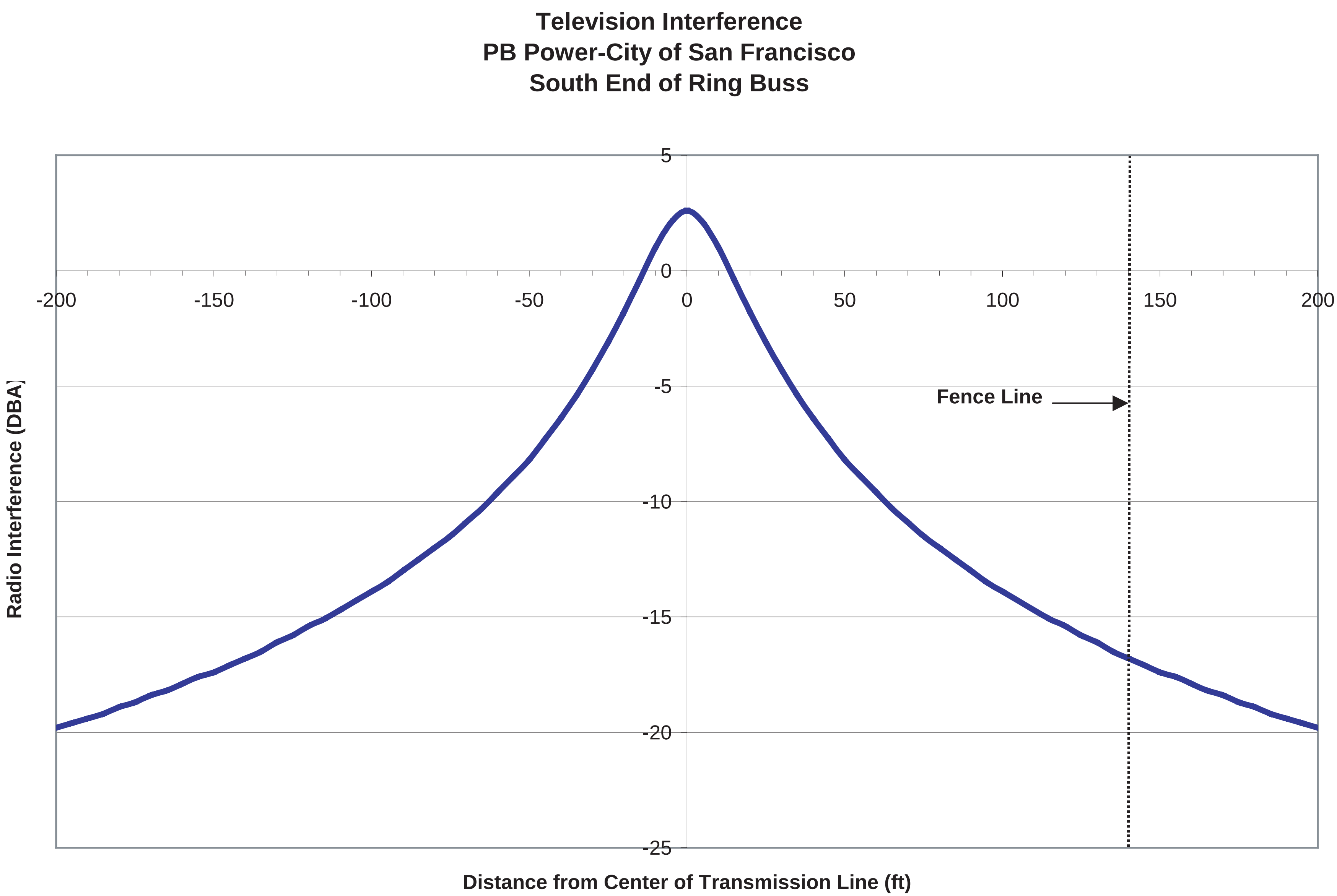

FIGURE 5-6
TELEVISION INTERFERENCE FOR 115kV BUS
SAN FRANCISCO ELECTRIC RELIABILITY PROJECT

D012004005RDD_14 (3/8/04)

CH2MHILL

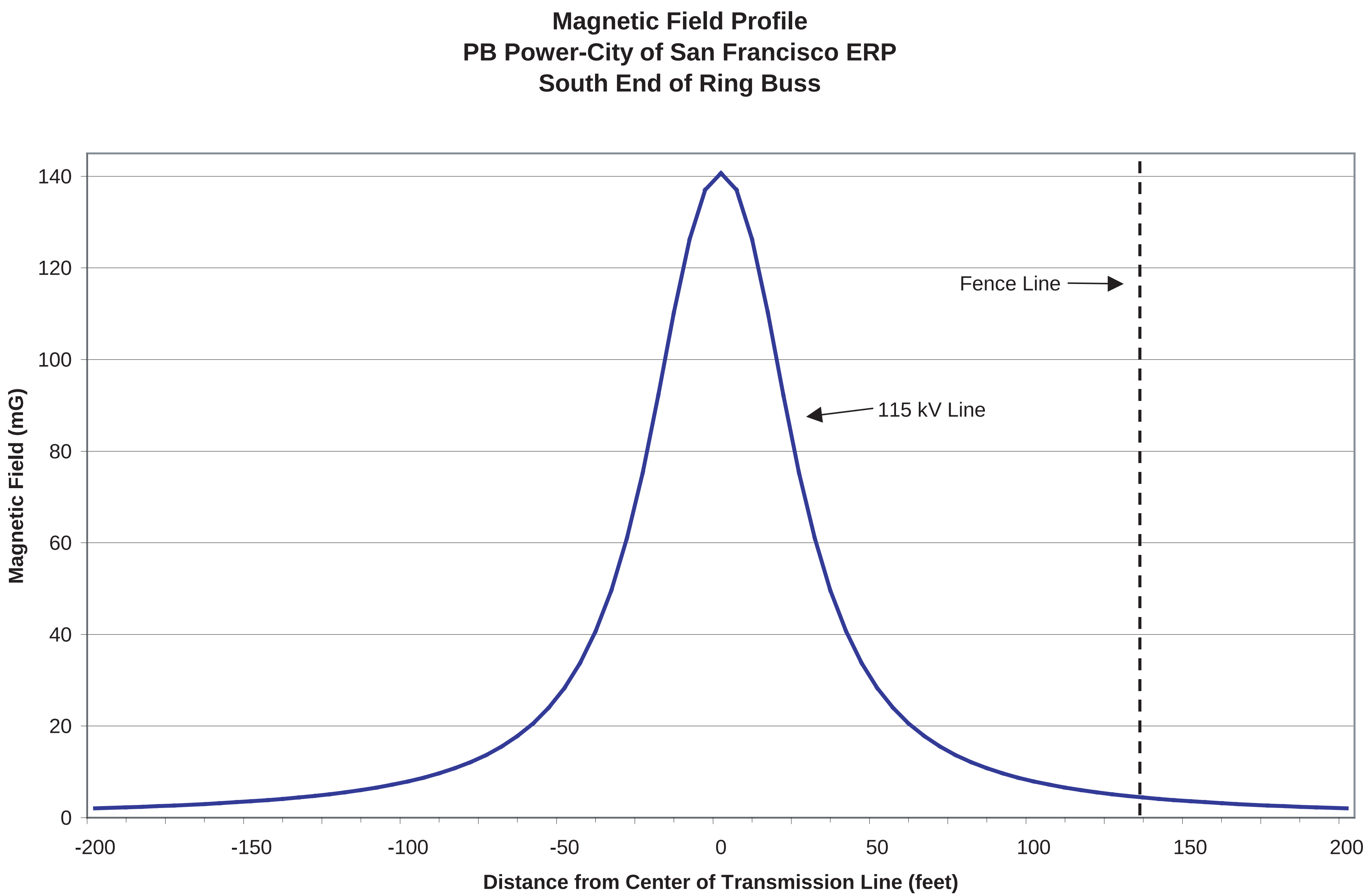

FIGURE 5-7
MAGNETIC FIELD CALCULATIONS FOR 115kV BUS
SAN FRANCISCO ELECTRIC RELIABILITY PROJECT

D012004005RDD_15 (3/8/04)

CH2MHILL

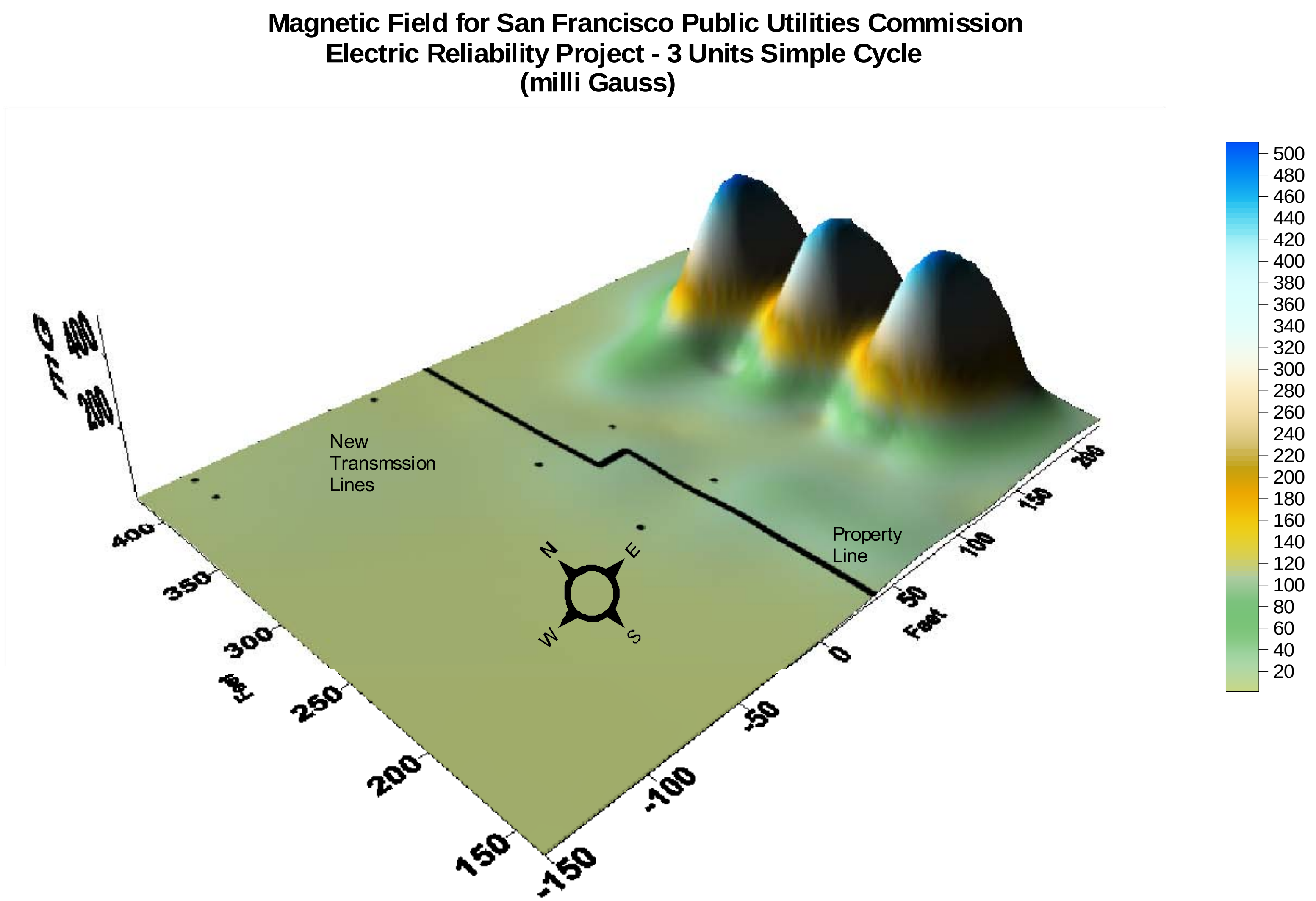

FIGURE 5-8
MAGNETIC FIELD OF GENERATOR BUSSES
SAN FRANCISCO ELECTRIC RELIABILITY PROJECT

D012004005RDD_23 (3/5/04)

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